Docket No.: 285291US0PCT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF: GROUP: 1793

Tsutomu FUKUDA, et al.

SERIAL NO: 10/566,270 EXAMINER: LI, JUN

FILED: January 30, 2006

FOR: HONEYCOMB CARRIER FOR EXHAUST GAS CLARIFICATION CATALYST AND METHOD FOR PRODUCTION THEREOF

DECLARATION UNDER 37 C.F.R. § 1.132

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

Sir:

Now comes Masahiro FUKUDA who deposes and states that:

1. I am a graduate of Kobe University and received my BS degree in the year 1996.

2. I have been employed by OHCERA for 8 years as a researcher in the field of inorganic materials chemistry.

3. The following experiments were carried out by me or under my direct supervision and control.

I have reviewed and understood the Office Action dated April 12, 2010 and I have read and understood the contents of Ono (US 4,483,94), Buscaglia et al (Journal of Materials Science 1996, 31: 5009-5016), Fukuda et al (JP 2002-145659) and Noda (US 2001/0056034) or Japanese language equivalents thereof.

The following results demonstrate that the presently claimed honeycomb carrier comprising aluminum magnesium titanate having an aluminum titanate compound of $Mg_xAl_{2(1-x)}Ti_{(1+x)}O_5$ and an alkali feldspar compound of $Na_yK_{1-y}AlSi_3O_8$ provides remarkable improvement on the long term thermal stability particularly where $0 < x \leq 0.5$.

(1) Samples

(1-1) From raw material powders comprising 100 parts by mass, as calculated as oxides, of a mixture comprising, Mg, Ti, and Al containing compounds in the same metal

component ratio as the metal component ratio of Mg, Al and Ti in an aluminum magnesium titanate represented by an empirical formula $Mg_xAl_{2(1-x)}Ti_{(1+x)}O_5$ where x = 0, 0.1, 0.25, 0.5, 0.6, 0.75, and 1, and 4 parts by mass of an alkali feldspar, seven honeycomb sintered products were prepared in the same manner as in Example 1-1 in the specification.

Another seven honeycomb sintered products were prepared in the same manner as in (1-1) above except that no alkali feldspar was added.

(2) Thermal Decomposition Resistance Test

From the above-mentioned fourteen honeycomb sintered products, test specimens of 10 mm × 10 mm × 10 mm were cut out and held in air at 1,000 °C for 500 hours, and then the thermal decomposition resistance of each of the specimens was examined as follows.

(2-1) Thermal Decomposition Resistance of Magnesium Aluminum Titanate

When x in the empirical formula $Mg_xAl_{2(1-x)}Ti_{(1+x)}O_5$ was $0 < x < 1$, the remaining ratio (%) of the magnesium aluminum titanate was determined by the procedure described at page 36, lines 1-27 in the specification.

(2-2) Thermal Decomposition Resistance of Magnesium Titanate

When x in the empirical formula $Mg_xAl_{2(1-x)}Ti_{(1+x)}O_5$ was x=1, the remaining ratio (%) of $MgTi_2O_5$ was supposed to be 100 % irrespective of addition of an alkali feldspar, because the magnesium titanate ($MgTi_2O_5$) did not thermally decompose at all.

(2-3) Thermal Decomposition Resistance of Aluminum Titanate

When x in the empirical formula $Mg_xAl_{2(1-x)}Ti_{(1+x)}O_5$ was x=0, the remaining ratio (%) of Al_2TiO_5 was determined from X-ray diffraction spectra as follow.

First, Al_2O_3 (corundum) and TiO_2 (rutile) were formed when the aluminum titanate (Al_2TiO_5) underwent thermal decomposition. Based on the integrated intensity ($I_{TiO2(110)}$) of the diffraction peak at the (110) face of the rutile (TiO_2) and the integrated intensity ($I_{Al2TiO5(023)}$) of the diffraction peak at the (023) face of the aluminum titanate (Al_2TiO_5), the intensity ratio r of the aluminum titanate (Al_2TiO_5) to the rutile (TiO_2) was obtained by the following formula:

$$r = I_{AT(023)}/(I_{AT(023)}+I_{TIO2(110)})$$

Further, also with respect to the sintered product before carrying out the thermal treatment at 1100 °C, the intensity ratio r_0 of the aluminum titanate (Al_2TiO_5) to the rutile (TiO_2) was obtained in the same manner. Then, based on r and r_0 obtained as described above, the remaining ratio β (%) of the aluminum titanate (Al_2TiO_5) was obtained by the following formula:

$$\beta\ (\%) = (r/r_0) \times 100$$

(3) Test Results

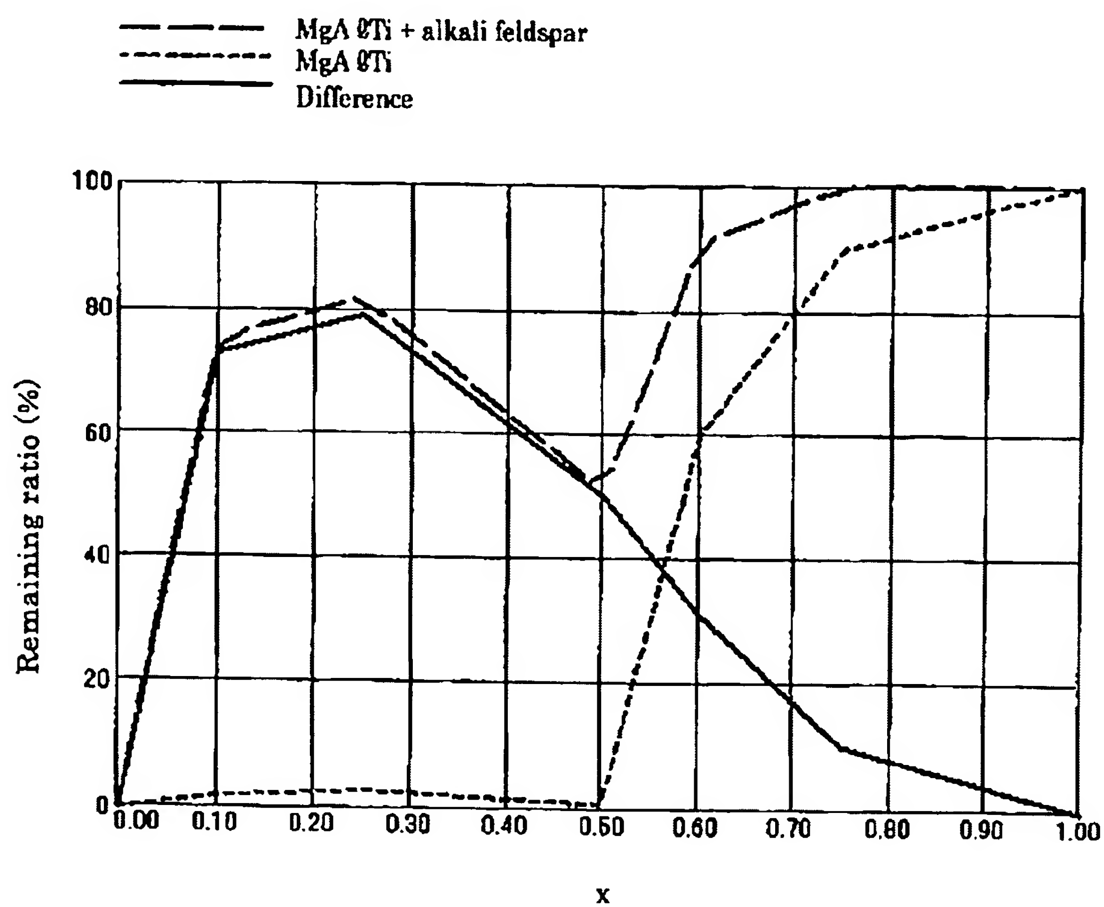
The results of the thermal decomposition resistance test are shown below in Fig. A.

For the aluminum titanate (Al_2TiO_5) where x = 0 in the empirical formula $Mg_xAl_{2(1-x)}Ti_{(1+x)}O_5$, the addition of an alkali feldspar provided no improvement on thermal decomposition resistance. For the magnesium titanate ($MgTi_2O_5$) where x = 1 in the empirical formula $Mg_xAl_{2(1-x)}Ti_{(1+x)}O_5$, the addition of an alkali feldspar provided no further improvement on thermal decomposition resistance. However, the addition of an alkali feldspar to the magnesium aluminum titanate improved the thermal decomposition resistance where $0 < x < 1$ in the empirical formula $Mg_xAl_{2(1-x)}Ti_{(1+x)}O_5$. Especially, the increase of the remaining ratio (%) by addition of an alkali feldspar was remarkable where $0 < x \leq 0.5$ in the empirical formula $Mg_xAl_{2(1-x)}Ti_{(1+x)}O_5$.

It is my opinion, based on the examples above and the disclosures of the specification, that such a remarkable improvement on thermal decomposition resistance of $Mg_xAl_{2(1-x)}Ti_{(1+x)}O_5$ by adding an alkali feldspar particularly where $0 < x \leq 0.5$ would not have been foreseen or expected based on the disclosures of Ono, Buscaglia, Fukuda, and Noda.

4. The undersigned petitioner declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

Fig. A Thermal Decomposition Resistance Test at 1100°C for 500 hours



5. Further deponent saith not.

Masahiro Fukuda
Signature

September 9th 2010
Date

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